Jae-Byum Chang

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EMPLOYMENT

Associate Professor (09/2022 – Present)
Assistant Professor (08/2018 – 08/2022)
Korea Advanced Institute of Science and Technology, Korea (08/2018 – Present)
Department of Materials Science and Engineering

Assistant Professor
Sungkyunkwan University, Korea (03/2016 – 08/2018)
Department of Biomedical Engineering

Postdoctoral Associate
Massachusetts Institute of Technology (MIT), USA (03/2014 – 02/2016)
Advisor: Prof. Ed Boyden

EDUCATION

Ph.D., Department of Materials Science and Engineering
Massachusetts Institute of Technology, USA (09/2008 – 01/2014)
Thesis title: Templated self-assembly for complex pattern fabrication
Advisor: Prof. Karl K. Berggren

B.S., Physics, Biological Science (double major)
Korea Advanced Institute of Science and Technology, Korea (*03/2001 – 02/2008)
(*including mandatory military service)

AWARDS & SERVICES

Editorial Board Member
Nano Convergence (07/2020 – 02/2022)

Simons Postdoctoral Fellowship
Project: Large-volume nanoscale imaging of synaptic proteins to understand the molecular mechanism of autism (Advisor: Prof. Ed Boyden and Prof. Guoping Feng)

Samsung Scholarship
Samsung Scholarship Foundation (09/2008 – 05/2013)

SELECTED PUBLICATIONS

1. **Chang, J.**, Chen, F., Yoon, Y., Jung, E. E., Babcock, H., Kang, J. S., Asano, S., Suk, H., Pak, N., Tillberg, P. W., Wassie, A., Cai, D. & Boyden, E. S., Iterative expansion microscopy, *Nat. Methods* doi:10.1038/nmeth.4261 (2017)
2. Seo, J., Sim, Y., Kim, J., Kim, H., Cho, I., Nam, H., Yoon, Y., and **Chang, J.**, PICASSO allows ultra-multiplexed fluorescence imaging of spatially overlapping proteins without reference spectra

measurements, *Nat. Commun.* **13** 2475 (2022)

3. Song, C., Song, D., Kang, D., Park, K., Park, C., Kim, H., Hur, Y., Jo, S., Nam, Y., Yeom, J., Han, S., and **Chang, J.**, Multiscale Functional Metal Architectures by Antibody-Guided Metallization of Specific Protein Assemblies in Ex Vivo Multicellular Organisms, *Adv. Mater*. (2022)
4. C. Song, J. Ahn, I. Yong, N. Kim, C. Park, S. Kim, S. Chung, P. Kim, I. Kim, and **J. Chang**, Metallization of targeted protein assemblies in cell-derived extracellular matrix by antibody-guided biotemplating, *Advanced Science* (2023)

FULL PUBLICATIONS

1. E. Heo, W. Hwang, H. Koo, S. Park, D. Kim, H. Kim, Y. Kim, and **J. Chang**, Precise and Selective Macroscopic Assembly of Dual Lock-and-Key Structured Hydrogel, *Materials Horizons* (2023)
2. C. Song, J. Ahn, I. Yong, N. Kim, C. Park, S. Kim, S. Chung, P. Kim, I. Kim, and **J. Chang**, Metallization of targeted protein assemblies in cell-derived extracellular matrix by antibody-guided biotemplating, *Advanced Science* (2023)
3. M. Eom, S. Han, P. Park, G. Kim, E. Cho, J. Sim, K. Lee, S. Kim, H. Tian, U. Bohm, E. Lowet, H. Tseng, J. Choi, S. Lucia, S. Ryu, M. Rozsa, S. Chang, P. Kim, X. Han, K. Piatkevich, M .Choi, C. Kim, A. Cohen, **J. Chang**, and Y. Yoon, Statistically unbiased prediction enables accurate denoising of voltage imaging data, *Nature Methods* (2023)
4. W. La, J. Seo, E. Heo, and **J. Chang**, Expandable ELAST for super-resolution imaging of thick tissue slices using a hydrogel containing charged monomers, *Scientific Reports* (2023)
5. Koo, H., Heo, E., Cho, I., Kim, S., Kang, J., and **Chang, J.**, Human hand-inspired all-hydrogel gripper with high load capacity formed by the split-brushing adhesion of diverse hydrogels, *Mater. Horiz.* (2023)
6. Kim, H., Kim, S., Sim, J., Ma, B., Yong, I., Jo, Y., Kim, T., **Chang, J.**, Park, S., Jeong, Y., and Kim, P., Glycation-mediated tissue-level remodeling of brain meningeal membrane by aging, *Aging Cell* (2023)
7. Sim, J., Park, C., Cho, I., Min, K., Lee, J., Chong, Y., Kim, J., Kang, L., Piatkevich, K., Jung, E., Kwon, S., Yoon, Y., Boyden, E., and **Chang, J.**, Nanoscale resolution imaging of the whole mouse embryos and larval zebrafish using expansion microscopy, *bioRxiv*, DOI: 10.1101/2021.05.18.443629 (2022)
8. Song, D., Song, C., Chung, J., Jang, E., Kim, H., Hur, Y., Hur, E., Kim, D., and **Chang, J.**, In situ silver nanoparticle development for molecular-specific biological imaging via highly accessible microscopies, *Nanoscale Adv.* (2022)
9. Lee, W., Heo, E., Koo, H., Cho, I., and **Chang, J.**, Strong, Chemically Stable, and Enzymatically On-Demand Detachable Hydrogel Adhesion Using Protein Crosslink, *Macromol. Rapid Commun.* (2022)
10. Choi, S., Na, H., Rahman R., Sim, J., Chang, J., and Nam, Y., Chitosan-coated Mesoporous Silica Particles as a Plastic-free Platform for Photochemical Suppression and Stabilization of Organic Ultraviolet Filters, *J. Photochem. Photobiol. B, Biol.* **235** 112565 (2022)

11. Andrews, B., **Chang, J.**, Collinson L., Li, D., Lundberg, E., Mahamid, J., Manley, S., Mhlanga, M., Nakano, A., Schoneberg, J., Valen, D., We, T., and Zaritsky, A., Imaging cell biology, *Nat. Cell Biol.* **24**, 1180 (2022)

12. Song, C., Song, D., Kang, D., Park, K., Park, C., Kim, H., Hur, Y., Jo, S., Nam, Y., Yeom, J., Han, S., and **Chang, J.**, Multiscale Functional Metal Architectures by Antibody-Guided Metallization of Specific Protein Assemblies in Ex Vivo Multicellular Organisms, *Adv. Mater*. (2022)

13. Seo, J., Sim, Y., Kim, J., Kim, H., Cho, I., Nam, H., Yoon, Y., and **Chang, J.**, PICASSO allows ultra-multiplexed fluorescence imaging of spatially overlapping proteins without reference spectra measurements, *Nat. Commun.* **13** 2475 (2022)

14. Im, H., Heo, E., Song, D., Park, J., Park, H., Kang, K., and **Chang, J.**, Fabrication of heterogeneous chemical patterns on stretchable hydrogels using single-photon lithography, *Soft Matter* (2022)

15. Yeon, H., Cho, Y., Seo, J., Sim, Y., and **Chang, J.**, Simultaneous amplification of multiple immunofluorescence signals via cyclic staining of target molecules using mutually cross-adsorbed antibodies, *Sci. Rep*. **12**, 8780 (2022)

16. Cho, I., **Chang, J.**, Simultaneous expansion microscopy imaging of proteins and mRNAs via dual-ExM, *Sci. Rep.* **12**, 3360, (2022)

17. Huyen, L., Koo, B., Jo, S., Liang, N., Yang, M., Cho, I., **Chang, J.**, Wang, T., Nam, Y., Artificial Taste Buds: Bioorthogonally Ligated Gustatory–Neuronal Multicellular Hybrids Enabling Intercellular Taste Signal Transmission, *ACS Biomater. Sci. Eng.* **7**(8), 3783-3792 (2021)

18. Cho, Y., Seo, J., Sim, Y., Chung, J., Park, C., Park, C., Kim, D., **Chang, J.**, FRACTAL: Signal amplification of immunofluorescence via cyclic staining of target molecules, *Nanoscale* **12**, 23506-23513 (2020)

19. Park, C., Cho, Y., Cho, I., Jung, H., Kim, B., Shin, J., Choi, S., Kwon, S., Hahn, Y. & **Chang, J.**, Super-Resolution Three-Dimensional Imaging of Actin Filaments in Cultured Cells and the Brain via Expansion Microscopy, *ACS Nano* **14**, 14999-15010 (2020)

20. Min, K., Cho, I., Choi, M. & **Chang, J.**, Multiplexed expansion microscopy of the brain through fluorophore screening, *Methods* **174**, 3-10 (2020)

21. Do, H. W., Choi, H. K., Gadelrab, K. R., **Chang, J.**, Alexander-Katz, A., Ross, C. A. & Berggren, K. K., Directed self-assembly of a two-state block copolymer system, *Nano Convergence* 5:25 (2018)

22. Cho, I., Seo, J. Y. & **Chang, J.**, Expansion microscopy, *J. Microsc.* **271**, 2, 123-128 (2018)

23. Yoon, Y., Dai, P., Wohlwend, J., **Chang, J.**, Marblestone, A. H. & Boyden, E. S., Feasibility of 3D reconstruction of neural morphology using expansion microscopy and barcode-guided agglomeration, *Front. Comput. Neurosci.*, doi: 10.3389/fncom.2017.00097 (2017)

24. **Chang, J.**, Chen, F., Yoon, Y., Jung, E. E., Babcock, H., Kang, J. S., Asano, S., Suk, H., Pak, N., Tillberg, P. W., Wassie, A., Cai, D. & Boyden, E. S., Iterative expansion microscopy, *Nat. Methods* doi:10.1038/nmeth.4261 (2017)

25. Choi, H. K.[+], **Chang, J.**[+], Hannon, A., Yang, J., Alexander-Katz, A., Berggren, K. K. & Ross, C. A., Nanoscale spirals by directed self-assembly, *Nano Futures* accepted (2017) ([+]equally contributed)

26. Chen, F., Wassie, A. T., Cote, A. J., Sinha, A., Alon S., Asano S., Daugharthy, E. R., **Chang, J.**,

Marblestone, A., Church G. M., Raj A. & Boyden, E. S., Nanoscale imaging of RNA with expansion microscopy, *Nat. Methods* **13**, 679-684 (2016)

27. Zhang, Y.[+], **Chang, J.**[+], Alvarez, M., Trujillo-deSantiago, G., Aleman, J., Batzaya, B., Krishnadoss, V., Kazemzadeh-Narbat, M., Ramanujam, A., Chen, F., Tillberg, P., Dokmeci, M., Boyde, E. & Khademhosseini, A., Hybrid microscopy: enabling inexpensive high-performance imaging through combined physical and optical magnifications, *Sci. Rep*. **6**, 22691 (2016) ([+]equally contributed)

28. **Chang, J.**[+]**,** Kim, Y. H.[+], Thompson, E., No, Y., Kim, N., Arrieta, J., Manfrinato, V., Keating, A. E. & Berggren, K. K. The orientations of large aspect-ratio coiled-coil proteins attached to gold nanostructures, *Small*, 10.1002/smll.201502419 (2016) ([+]equally contributed)

29. Kim, J. Y., Kwon, S. J., **Chang, J.**, Hatton, A. T., Ross, C. A. & Stellaci, F. Two-dimensional Nanoparticle supracrystals: a model system for 2D melting. *Nano Lett.* 16(2), 1352-1358 (2016)

30. Do, H. W., **Chang, J**. & Berggren, K. K. Three-dimensional nanofabrication using hydrogen silsesquioxane/poly(methylmethacrylate) bilayer resists. *J. Vac. Sci. Technol.* **B32**, 06F501 (2014)

31. Ross, C. A., Berggren, K. K., Cheng, J. Y., Jung, Y. S. & **Chang, J**. Three-dimensional nanofabrication in block copolymer self-assembly. *Adv. Mater*. **26**, 4386 (2014)

32. **Chang, J.**[+], Choi, H. K.[+], Hannon, A. F.[+], Alexander-Katz, A., Ross, C. A. & Berggren, K. K. Template rules for tile-based directed self-assembly. *Nat. Commun*. **5**, 3305 (2014) ([+]equally contributed)

33. Kim, J. Y., **Chang, J.**, Ross, C. A. & Stellacci, F. Seeded solution growth of nanoparticles into ordered three-dimensional supracrystals. *RSC Adv*. **3**, 10628-10631 (2013)

34. Witharana, S., Phillips, B., Strobel, S., Kim, H. D., **Chang, J**. *et al*. Bubble nucleation on nano- to micro-size cavities and posts: an experimental validation of classical theory. *J. Appl. Phys*. **112**, 064904 (2012)

35. **Chang, J.**[+], Son, J. G.[+], Hannon, A. F., Alexander-Katz, A., Ross, C. A. & Berggren, K. K. Aligned sub-10-nm block copolymer patterns templated by post arrays. *ACS Nano* **6**, 2071-2077 (2012) ([+]equally contributed)

36. Son, J. G., **Chang, J.**, Berggren, K. K. & Ross, C. A. Assembly of sub-10-nm block copolymer patterns with mixed morphology and period using electron irradiation and solvent annealing. *Nano Lett*. **11**, 5079-5084 (2011)

37. Son, J. G., Gwyther, J., **Chang, J.**, Berggren, K. K., Manners, I. & Ross, C. A. Highly ordered square arrays from a templated ABC triblock terpolymer. *Nano Lett.* **11**, 2849-2855 (2011)

38. Strobel, S., Kirkendall, C., **Chang, J.** & Berggren, K. K. Sub-10-nm structures on silicon by thermal dewetting of platinum. *Nanotechnology* **21**, 505301 (2010)

39. Yang, J. K. W., Jung, Y. S., **Chang, J.**, Mickiewicz, R. A., Alexander-Katz, A., Ross, C. A. & Berggren, K. K. Complex self-assembled patterns using sparse commensurate templates with locally varying motifs. *Nat. Nanotechnol*. **5**, 256-260 (2010)

40. Jung, Y. S., **Chang, J.**, Verploegen, E., Berggren, K. K. & Ross, C. A. A path to ultra-narrow patterns using self-assembled lithography. *Nano Lett*. **10**, 1000-1005 (2010)

41. Ross, C. A., Jung, Y. S., Chung, V. P., Son, J. G., Gowtrik, K. W., Mickiewicz, R., Yang, J. K. W.,

Chang, J. *et al*. Templated self-assembly of Si-containing block copolymers for nanoscale device fabrication. *Proc. SPIE*., 7637 (2010)

42. Hahn, Y., **Chang, J.**, Jin, Z., Kim, H. & Park, J. Magnetophoretic position detection for multiplexed immunoassay using colored microspheres in a microchannel. *Biosens. Bioelectron*. **24**, 1870-1876 (2009)

43. Lee, Y., **Chang, J**., Kim, H. K. & Park, T. G. Stability studies of biodegradable polymersomes prepared by emulsion solvent evaporation method. *Macromol. Res.* **14**, 359-364 (2006)

BOOK CHAPTERS

1. Cho, I., Shim, J., & **Chang, J.**, Expansion microscopy imaging of various neuronal structures, *Methods in Cell Biology* (2020)
2. **Chang, J.** Expansion microscopy for brain imaging, *Advanced Optical Methods for Brain Imaging* (2018)